Research That Goes Beyond the Farm Gate

The 4-H Club, that venerable bastion of educational activity for American youth, summed it up admirably in the club's motto: "To make the best better."

Those five simple words also encompass the purpose of the Agricultural Research Service. The United States has the world's greatest agricultural system, capable of producing the most abundant, safe, and affordable food supply anywhere—as well as a multitude of nonfood products important to everyday life.

Given this demonstrated level of excellence, is it really possible to make the best better? ARS scientists believe it is, and they've put their ingenuity to work time and time again to accomplish just that.

It might surprise some that the agency focuses not only on creating the best agricultural raw materials, but also on developing the most efficient and cost-effective use of those materials. For example, in this issue of *Agricultural Research*, you'll read how ARS scientists designed a system that uses fiber optic probes to reveal possible quality problems in chicken carcasses as they speed down the processing line.

ARS has a deep commitment to technology transfer, going beyond breeding a great new soybean variety or creating an ag-based, environmentally friendly product to helping propel ideas and inventions from the laboratory to the marketplace. ARS wants its discoveries to be useful and practical—as well as exceptional.

Some of ARS' processing successes are now legendary—the development of technology for durable-press cotton fabric, for example, or the Time-Temperature Tolerance Project that laid the foundation for the procedures still followed today in processing frozen vegetables. Let us not forget that 50 years ago, frozen condensed orange juice—today a staple of the American breakfast—was on the fast track to failure until ARS researchers helped fine-tune the process for preserving its flavor.

Through the years, there have been many ARS processing-oriented discoveries to celebrate, such as:

• ARS scientists in Louisiana have shown that spinning cotton in a new way can make the most of the strength and versatility of naturally colored cotton fabrics. Some cotton varieties can grow in soft earth tones of olive green, pumpkin, or deep russet, eliminating the need for dyes. But these fibers also tend to be shorter and weaker than white varieties, complicating the spinning process. Two ARS-patented methods of spinning—staple-core and filament-core spinning—can be used to make composite yarns with an outer layer of naturally colored cotton and a tougher inner core of white cotton or synthetic fibers. The resulting fabrics have the look and feel of solid-colored cotton, complemented by extra fiber strength.

• Also in the world of textiles, ARS scientists in Mississippi developed a new computerized system that automatically measures cotton quality at various stages of gin processing. This system predicts the effects of moisture content, color, and trash and then routes the cotton through the proper mechanical cleaning and drying sequences so it gets an optimum grade. This means ginners can customize their ginning process for each farmer. Data from 1994 to 1996 show farmers receive additional profits of $10 to $20 per bale with the customized ginning system. The system also cuts energy use, thereby saving the ginner nearly $1 per bale.

• A soy protein refining process developed by ARS scientists in North Carolina yields protein so pure it rivals synthetic proteins used by the pharmaceutical industry. The same protein has great food potential; for example, it might be whipped into fat-free dessert topping. In the soybean industry, 60-percent protein purity is the standard, but the ARS process yields nearly 100-percent pure protein.

• Software developed by ARS researchers in Wyndmoor, Pennsylvania, helps food processors predict the fate of *E. coli* O157:H7 and other illness-causing food pathogens, including *Salmonella* and *Listeria monocytogenes*, in their products. The user types in information on food formulation or storage conditions, including temperature, salt levels, and acidity. Then the program graphically predicts the growth or death of the organism. This user-friendly software provides a first-round estimate of the safety potential of foods.

• ARS scientists at Wyndmoor also developed a process to use potassium chloride in the meat-packing and hide-tanning industries, in a switch from the common salt now used. Shifting to potassium chloride would help the packing and tanning industries solve an environmental problem—disposal of the leftover salt brine. Unlike sodium, potassium is a plant nutrient, so the waste from the new process could be put to work as crop fertilizer. The ARS scientists say leather quality is just as high when produced with potassium chloride.

From snack foods to leather goods, ARS scientists go the extra mile to find ways to turn the world's best raw products into even better finished goods—all part of keeping American agriculture and industry competitive in the global marketplace.

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